

## **Real World Implementation of Infant Behavioral Sleep Interventions: Results of a Parental Survey**

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## Abstract

**Objective:** To describe parental practices implementing BSI outside a clinical setting.

**Study Design:** 652 parents completed an online survey about their experience using BSI with their infant or toddler. Parents were recruited through a Facebook group designed as a peer support group for parents using BSI.

**Results:** On average, parents implemented BSI when their infant was 5.6 ( $\pm 2.77$ ) months. Parents most often used modified (49.5%) or unmodified extinction (34.9%), with fewer using a parental presence approach (9.8%). Regardless of BSI type, more parents endorsed 'a great deal of stress' during the first night (42.2%) than one week later (5.2%). The duration of infant crying was typically highest the first night (reported by 45%;  $M = 43$  minutes) and was significantly reduced after 1 week ( $M = 8.54$  minutes). Successful implementation of BSI on the first attempt was reported by 83%, with a median and mode of 7 days until completion (79% by 2 weeks). Regardless of BSI type, after intervention parents reported their infant had less difficulty falling asleep, fewer night awakenings, and were more likely to sleep in their room and/or in their own crib/bed.

**Conclusions:** The majority of parents report successfully implementing BSI, with significantly reduced infant crying by the end of one week and success within two weeks. Few differences were found between behavioral approaches.

Whereas night awakenings in newborns are common and expected, an estimated 20-30% of older infants and toddlers have frequent problematic night awakenings requiring parental intervention throughout the night.<sup>1-3</sup> Bedtime problems and night awakenings persist in young children<sup>4</sup> and have been associated with daytime behavior difficulties,<sup>1,5,6</sup> reduced health-related quality of life,<sup>1</sup> and negative health outcomes.<sup>5,7-9</sup> In addition, these night awakenings are linked with parental stress,<sup>10</sup> maternal depression,<sup>11</sup> and overall poorer caregiver physical and mental health.<sup>12</sup> On a societal level, sleep problems in young children are associated with significant increases in healthcare costs.<sup>13</sup>

Previous studies document that behavioral sleep intervention (BSI) reduces problematic infant night awakenings, leading to improvements in child sleep as well as child and family functioning.<sup>14-16</sup> BSI in infants and young children, sometimes called “sleep training,” is a term used to describe a variety of approaches parents use to encourage infants to fall asleep independently. Beneficial outcomes include improvements in child daytime functioning (e.g. crying, mood), parent mood and stress, parent sleep, and marital satisfaction, with no studies finding adverse outcomes.<sup>1,14</sup> While the efficacy of BSI with young children has been well documented in clinical trials<sup>12,13</sup>, little is known about parental experience implementing BSI outside a clinical or research setting. Furthermore, few studies have documented the process of implementing BSI, such as the duration of crying, number of days until completion, and parental stress.

Thus, the aim of the current study is to describe parental experience utilizing BSI with infants and toddlers in a real world setting. Specific domains measured in this survey include

intervention approach, implementation details, and perceptions of the stress and success of the BSI. A better understanding of parental experience with infant BSI can be used to craft and refine guidance for PCPs and parents.

## Methods

### *Participants and Setting*

Participants were recruited to complete an online survey via posts on a Facebook group called *Respectful Sleep Training/Learning*. This group was in existence for about three years prior to the survey and serves as a peer support group for parents using BSI of all kinds. The group is not owned by a commercial or professional entity, but is maintained and moderated by approximately ten parent volunteers. Group members (generally parents who are currently implementing BSI or considering BSI in the future) opt to join the group by making a request through their Facebook account.

### *Survey*

The survey was hosted on an external survey website (Qualtrics). Group administrators posted a request (three posts across two weeks in September 2016) and link for members who were parents/caregivers of a young child to complete the survey. We did not offer any payment or incentive for participating, and emphasized that participation was voluntary and would not affect their membership in the Facebook group. The study was considered by the Office of Research Compliance at the Indiana University School of Medicine as exempt from Human Subjects Review and no identifying information was collected.

Parents were retrospectively asked to describe their child's sleep using items from the Brief Infant Sleep Questionnaire (BISQ)<sup>17</sup> during the two weeks before and two weeks after BSI. Parents with more than one child were asked to respond about the child with whom they had most recently completed BSI. Additional questions included: (1) age of the child at time of implementation; (2) specific approach implemented; (3) parent and child response to BSI, which included factors such as number of days implemented, duration of infant crying, and parental stress; and (4) sources from which parents received help and support for BSI. Parents were asked to rate the amount of informational support (defined as *information about sleep training methods or infant sleep patterns, scheduling, and norms*) they received from a variety of sources, with the response options of *not at all*, *some*, or *very much*. The categories *some* and *very much* were combined in the analysis to describe the percentage of the sample receiving support from each source.

We defined four specific BSI approaches for respondents. *Unmodified extinction* was defined as a parent leaving the room and not returning to check on the infant (sometimes called “cry it out.”) We described *modified extinction* as an approach in which a parent leaves the room but returns at intervals to check or reassure the infant (e.g., Ferber method). Two additional methods included 1) *parental presence*, defined as a parent staying in the room continuously without providing additional support, and 2) *parental presence with support*, defined as staying in the room continuously and providing help (e.g., patting, picking up) until the infant was asleep.

## Results

### *Survey Response*

Seven hundred and ninety-six participants followed the link to the survey and completed at least one item. We omitted data from 144 participants who completed five or fewer questions (thus providing no information about their BSI process), leaving a final sample of 652 participants (demographics provided in Table 1). Of the 652 participants who completed our minimal threshold (5 questions), we compared (1) those who completed the entire survey ( $n = 484$ ) to (2) those who left any time before the last question ( $n = 168$ ) on the following variables: child age at start of BSI, child current age, type of BSI, overall level of satisfaction with BSI, intensity of child's cry, number of days to successfully complete BSI, parent stress on the first night of a BSI and one week later. Unfortunately, most of the sociodemographic questions were at the end of the questionnaire; therefore, our ability to assess differences in race, ethnicity, age, and education were limited.

Participants were more likely to complete the entire survey if they used one of the extinction-based BSIs (76-80% completed the entire survey) compared to those utilizing a parental presence BSI (60-70% completed the entire survey),  $\chi^2(3) = 11.28, p = .01$ . However, this should be interpreted with caution given the relatively small number of participants within the parental presence BSI groups. Additionally, participants were more likely to complete the survey if they reported higher levels of stress on the first night of their chosen BSI,  $F(1, 512) = 26.69, p < .01$ . All other considered variables were comparable.

Data from 136 (17%) families who reported that BSI implementation was over one year ago were not included for questions pertaining to specifics of implementation. Given the level of detail requested from families (e.g., how many minutes did your child cry on the first night) our

research team felt minute-level data may not be accurately recalled after one year. Therefore, when referencing time elements, data from 516 families (83%) were included.

### *Analytic approach*

Initial data inspection revealed that 17 responses were deemed inconsistent/unlikely (e.g., parent response times of 0.3 minutes) and were removed for these responses only, with all other data retained. This reflects < .01% of the provided responses; given this low percentage, imputation for missingness was not warranted. No differences across infant sex were found for any variables. Chi-square analyses for categorical variables and analysis of variance (ANOVA) for continuous variables were conducted across the four BSI approaches. We used a Bonferroni correction to reduce Type I error (adjusted  $p < .007$ ). Data checks for the assumptions of ANOVA did reveal several outliers for *BSI Duration*. For this reason, weekly bins were used to compare across the BSI approaches (as outlined below).

### *Behavioral Sleep Intervention Approach*

As shown in Table 2, parents were most likely to report using modified extinction ( $n = 309$ ; 49.5%) and unmodified extinction ( $n = 218$ ; 34.9%), followed by parental presence with support ( $n = 64$ ; 10.3%) and parental presence without support ( $n = 33$ ; 5.3%).

### *Infant Age*

Parents started BSI when their infant was as young as one month of age or less ( $n = 17$ , 3%) and as late as 18 months of age. Only 27 (4%) of respondents endorsed starting after 12 months of age. On average, parents started BSI at 5.6 ( $\pm 2.77$ ) months of age. Age at start did not vary by

BSI approach,  $F(3, 620) = 1.03$ ;  $p = .38$ . Most parents conducted sleep training for the first time when their infant was between 3-5 months (Figure 1).

### *Implementation Timing*

Approximately two-thirds of parents implemented BSI at both bedtime and during awakenings (Table 2). Roughly one-third implemented BSI at bedtime only, and a small percentage (~5%) implemented BSI during awakenings only. The ratio of parents who chose bedtime only, awakening only, or both did not vary by BSI approach,  $\chi^2(6, n = 623) = 7.10$ ,  $p = .31$ .

### *Checking*

Most parents checked on their infant in 5 to 25 minute intervals and stayed in the room for approximately 1 minute (Table 3). While in the room, parents most commonly said comforting words and touched their child. Almost a third picked up their child, and some (15%) stayed until their child stopped crying. Several parents (25%) endorsed other behaviors (e.g., returning a pacifier). Overall, parents reported checking was more helpful for them than for their infant,  $\chi^2(16, N = 256) = 122.70$ ,  $p < .001$ . For example, 35% of parents reported the checks were very helpful for them but only 13% endorsed that the checks were very helpful for their infant.

### *Infant Crying*

Infant crying was typically highest the first night (reported by 45%), was 43 minutes on average, and was significantly reduced after 1 week ( $M = 8.54$  minutes;  $t(390) = 19.97$ ,  $p < .001$ ).

Almost half of parents endorsed that their child cried the longest on the first night (Figure 2).

There were no differences between BSI approaches for duration of crying on night one,  $F(3,$



434) = .48,  $p = .70$ , or the reduction in crying after one week,  $F(3, 387) = .90$ ,  $p = .45$ . Parent reports of crying intensity followed a similar pattern. Infant crying was rated as most intense (on a scale of 1-5) on the first night of BSI ( $M = 4.42$ ), and was equally true for all of the BSI approaches,  $F(3, 524) = .89$ ,  $p = .44$ .

### *BSI Duration*

When asked about number of days to successful completion of BSI, parents reported a range from 1 to 120 days with a median and mode of 7 days, and mean of 12.5 days. Each BSI approach contained outliers ranging from 30 to 120 days; therefore days to successfully complete BSI were binned into 1, 2, 3, and greater than 4 weeks with 55%, 24%, 7%, and 14% of parents reporting a successful BSI, respectively (Figure 3). Overall, the likelihood of taking 4 weeks or more to complete BSI was higher for the two parental presence approaches,  $\chi^2(9, n = 424) = 29.42$ ,  $p < .001$ . However, given the small number of responses in each of these groups, this should be interpreted with caution.

### *Parental Stress*

Parents reported high levels of stress on the first night, regardless of their BSI approach,  $F(3, 510) = 1.29$ ,  $p = .28$ . Parents also reported a significant decrease in their stress one week later,  $t(505) = 32.89$ ,  $p < .001$ . This decrease in stress was comparable across the four BSI approaches,  $F(3, 502) = 2.17$ ,  $p = .09$ .

### *Success Rate and Parental Satisfaction*

On a rating of 1-7 parents were, on average, very satisfied ( $M = 6.18$ ;  $SD = 1.50$ ) with BSI. Most parents in each BSI approach reported they were at least somewhat satisfied with their BSI approach (range 76-94%; Table 2). The small group of parents in the *parental presence with support* group endorsed the lowest level of satisfaction ( $M = 5.21$ ;  $SD = 2.03$ ),  $F(3, 509) = 9.78$ ,  $p < .001$ . Within this group, 76% endorsed being extremely to slightly satisfied (ratings of 7, 6, or 5) and within the other groups 94%, 91%, 87% endorsed the same satisfaction range.

For most parents, their first attempt at BSI was successful ( $n = 426$ , 83%). This percentage varied by BSI approach,  $\chi^2(3, n = 513) = 16.15$ ,  $p = .001$  with the highest first attempt success rate in the *unmodified extinction* group (89.5%) followed by *parental presence with support* (83.3%), *modified extinction* (83.0%), and *parental presence with support* (65.1%). For parents who felt they were unsuccessful on their first attempt, about half ( $n = 38$ ; 47%) stopped within the first week, with most ( $n = 53$ ; 67%) making at least one more attempt. Of those who tried BSI again, 70% ( $n = 37$ ) were ultimately successful, resulting in an overall success rate of 89.5%. For those parents who made multiple attempts, a substantial minority endorsed using more than one BSI approach. Overall, 27% ( $n = 121$ ) were ultimately successful with a different approach than they started with. The most common shift was from *modified extinction* to *unmodified extinction* ( $n = 80$ ; 66% of approach changers).

#### *Sources of Help and Informational Support for BSI*

Respondents reported receiving either “some” or “very much” informational support for BSI from a variety of professionals, including a pediatrician or family doctor (51%), non-clinical sleep consultant or coach (16.2%), or sleep specialist clinician (9.2%). Other individuals

providing support included friends (73.4%), partner/spouse/co-parents (51.4%), and relatives (39.1%). Parents further reported receiving informational support from online forums and websites (96.5%) and parenting books (70.4%).

### *BSI Outcomes*

Regardless of BSI approach, parents were more likely to report a consistent bedtime routine (used every night), less difficulty falling asleep, fewer night awakenings and feedings, shorter ‘fall asleep’ times, and children were more likely to sleep in their room and in their own crib or bed after BSI (Table 4). For example, prior to BSI roughly half (55.6%) of parents endorsed a consistent bedtime routine every night. After BSI, 86.1% endorsed a consistent nightly routine.

## Discussion

Overall, almost all parents in our survey reported successfully implementing BSI in a real-world setting, specifically parents participating in an on-line peer support group for BSI. Most (83%) were successful on their initial attempt, with a total success rate of 90% across all attempts. Further, parents perceived significant improvements in their child’s sleep after implementing BSI, similar to findings in controlled research trials of BSI.<sup>18</sup> Improvements after BSI were also clinically significant, such as a mean reduction from 3-4 night wakings to 1 or less.

Not surprisingly, parents reported high levels of stress at the beginning of the process. This is likely due to the amount of infant crying, which averaged 43 minutes on the first night.

Encouragingly, infant crying was significantly reduced after one week, averaging 8 minutes, as was parental stress. Over 75% of families reported their BSI was successful within the first two

weeks, with a median of seven days, and only 14% of families reported that BSI took longer than 4 weeks. This information can be helpful for pediatric health providers in discussing BSI with parents. For example, difficulty tolerating infant crying is a common barrier cited by parents for stopping BSI.<sup>19</sup> Providing parents with expectations as to the typical amount of crying and duration to success could help normalize the process. Parents may likewise be encouraged by guidance about the rapid reduction of crying intensity, duration, and associated parental stress after the first week.

Parents utilized a variety of different approaches to BSI, though the majority in this sample used extinction-based approaches. A smaller proportion of parents used a parental presence approach that involved remaining in the room. This could reflect our sampling approach which pulled from a group of parents looking for support for their BSI. Parents using presence approaches may not seek out support from a group in which more parents seem to be using extinction-based approaches. Also notable is that roughly 25% of all parents started with one approach and switched to another, most commonly changing from modified to unmodified extinction. This may be because parents find checks to be only moderately helpful to their infant, with a mean helpfulness rating of just below 3 on a 1 to 5 scale.

Previous comparative studies have not found one BSI approach to be superior to another, although the extinction-based approaches have been studied more frequently than the parental presence approaches.<sup>15</sup> Our findings generally are consistent with prior work, as parents reported successful outcomes across all four BSI approaches, with few differences. We did not find differences between the four approaches for infant age at time of implementation, amount or

intensity of infant crying, parental stress, or reduction in parental stress after 7 days. However, because of relatively small sample sizes for the parental presence approaches, we may have failed to detect some true differences between groups. On the other hand, parent satisfaction was significantly lower for the parental presence with support approach compared to the others, and parents using unmodified extinction had a significantly higher first-attempt success rate compared to modified extinction. Not surprisingly, the approaches in which a parent remained in the room took more days to complete, as by definition these approaches tend to be more gradual. Overall, it is helpful for pediatric health providers to inform parents that there are a variety of approaches from which they can choose; as one approach is not known to be more efficacious, parents can select based on their personal preferences, their tolerance for being near their crying infant, and their infant's temperament.

Surprisingly, parents reported implementing BSI when their infant was quite young, with a mean of just over 5 months and a mode of 4 months of age. The majority of studies examining the efficacy of BSI have been conducted in infants 6 months or older,<sup>15</sup> and reviews of BSI in children younger than 6 months have found mixed results.<sup>20-22</sup> Additionally, younger infants may still need feedings during the night. BSI at bedtime only (i.e., using a BSI approach at the beginning of the night but soothing or feeding after night wakings) would not affect feeding during the night; however, most parents in this sample reported implementing BSI during night awakenings (thus presumably reducing or eliminating night feedings). With some popular sleep books recommending BSI at young ages,<sup>23</sup> it will be important to conduct additional research to establish the age and/or weight at which it would be appropriate for an infant to forego night feedings.

Study strengths include a large sample size and the inclusion of a validated measure to assess sleep patterns. Nevertheless, there are several limitations that deserve note. With the exception of the BISQ, we did not use validated measures in our survey. We recruited survey respondents from a Facebook group intended to provide support for parents implementing BSI; thus, our sample is not representative of the general population. However, our intent is not to provide an overall prevalence of BSI use amongst all parents, but rather to describe the implementation process and outcomes amongst parents who have elected to use BSI. While this Facebook group does not endorse a particular approach to BSI, respondents post and interact with one another, meaning that individual respondents are not independent. Parents who prefer a certain approach to BSI (in particular, extinction) may have been more likely to join the group. There may also be a response bias in those within the group who chose to complete the survey. For example, parents who successfully completed BSI may have been more willing to remain in the support group and respond to the survey, resulting in an overestimation of the success rate. As our survey was not translated into other languages, only English-speaking parents participated. Additionally, the majority of our respondents were Caucasian and the majority had a moderate to high degree of education attainment. While this may reflect to some degree the demographics of parents who are utilizing BSI, sampling bias likely also plays a role (i.e., our demographics may also reflect those who utilize parenting support groups on Facebook). Further, asking parents about their child's sleep before and after BSI (with no control group) likely yielded inflated effects for improvements in infant sleep. Finally, parental responses were retrospective, though most had implemented BSI within the previous year.

## Conclusion

This study offers the first description of parental use of BSI in a specific real-world context (on-line peer support), providing information about BSI implementation that pediatric health providers can use to guide parents. The majority of parents report successfully implementing behavioral sleep intervention at a variety of ages across infancy, primarily using extinction-based approaches. Infant crying and parental stress is considerable on the first night, but significantly reduced within one week, with average success within one week (79% by two weeks). Few significant differences were found between approaches, suggesting that health providers should offer parents options for BSI implementation.

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**Abbreviations:** Behavioral Sleep Intervention (BSI)

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**Figure Legends**

**Figure 1:** Percentage of Sample (with 95% CI) by Infant Age at BSI Implementation

**Figure 2:** Parent Report of Which Night Their Child Cried the Most During BSI (by percentage of sample with 95% CI)

**Figure 3:** Days to Successful Completion Across BSI (with 95% CI)